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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/080,057

02/20/2002

Chang Chul Ha

23976-08191

8563

7590

05/21/2004

cDREAM DISPLAY CORPORATION
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EXAMINER

KEANEY, ELIZABETH MARIE

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 05/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/080,057

Applicant(s)

HA ET AL.

Examiner

Elizabeth Keaney

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 10, 11 and 13-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 10, 11 and 13-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Receipt is acknowledged of the Amendment and Remarks filed 10 February 2004.

Response to Arguments

Applicant's arguments with respect to claims 1-7, 10 and 11 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1,2,6,7,10,11,13,14,15 and 19-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Han et al. (US Patent 6,515,415; hereinafter Han).

Re claim 1: Han discloses, in figure 3 and throughout the disclosure, a device comprising:

- an emitter electrode (120);
- a resistor layer (125);
- an electrically conductive seed layer (column 5, line 24) overlaying part of the resistor layer, the seed layer including a plurality of laterally separated sections;
- a dielectric layer (130) overlying the resistive layer;
- a gate electrode (190) overlying the dielectric layer above the resistive layer and having lateral edges in approximate vertical alignment with lateral edges of the dielectric layer; and
- a carbon based electron-emissive element (121) positioned over the sections of the seed layer above the emitter electrode and situated in a composite opening extending through the gate electrode and the dielectric layer (column 5, lines 23-29).

Re claim 2: Han discloses, in figure 3 and throughout the disclosure, a device comprising:

- an emitter electrode (120);

- an electrically resistive layer (125) overlying at least a portion of the emitter electrode;
- a dielectric layer (130) overlying the resistive layer;
- a plurality of laterally separated gate electrodes (190) overlying the dielectric layer above the resistive layer; and
- a multiplicity of electron-emissive elements (121) grown from a seed layer that includes a plurality of unconnected sections above the emitter electrode and situated in composite openings extending through the gate electrodes and the dielectric layer (column 5, lines 23-29).

Re claim 13: Han discloses, in figure 3 and throughout the disclosure, an electron-emitting device comprising:

- an emitter electrode (125);
- a gate electrode (190);
- a plurality of groups of electron-emissive elements (121) situated in one or more openings in the gate electrode; and
- a seed layer (column 5, line 24) including at least two laterally separated sections, each section of the seed layer electrically coupled between one or more groups of electron-emissive elements (121) and the emitter electrode (125).

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Re claims 6 and 19: Han discloses the multiplicity of electron-emissive elements comprise carbon (column 3, line 55).

Re claims 7 and 20: Han discloses the multiplicity of electron-emissive elements being filaments (column 3, line 55).

Re claim 10: Han discloses, in figure 3 and throughout the disclosure, the electron-emissive elements (121) positioned over at least two sections of the seed layer defines a single pixel of a display system.

Re claim 11: Han discloses, in figure 3 and throughout the disclosure, the electron-emissive elements (121) are allocated into a number of laterally separated sets, each set comprising multiple electron emissive elements, overlying at least one of the sections of seed layer (column 5, lines 23-29).

Re claim 14: Han discloses, in figure 3 and throughout the disclosure, an electrically resistive layer (125) overlying at least a portion of the emitter electrode, the electrically resistive layer electrically coupled in series between the emitter electrode (125) and the seed layer (column 5, line 24).

Re claim 15: Han discloses, in figure 3 and throughout the disclosure, a dielectric layer (130) disposed between the electrically resistive layer (125) and the gate electrode (190).

Re claim 21: Han discloses, in figure 3 and throughout the disclosure, the sections of the seed layer symmetrically over-align with the openings of the gate electrode (column 5, lines 23-29).

Re claim 22: Han discloses, in figure 3 and throughout the disclosure, the multiple sections of the seed layer corresponding to a single pixel of a display system (160,170).

Re claim 23: Han discloses, in figure 3 and throughout the disclosure, multiply sections of the seed layer (column 5, line 24, 121) correspond to a single color (170) of a display system.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 1,2,5-7,10,11,13-15,17 and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cleeves et al. (US Patent 6,144,144; hereinafter Cleeves) in view of Xu et al. (US Patent 5,973,444; hereinafter Xu).

Re claim 1: Cleeves discloses, in figure 3 and throughout the disclosure, a device comprising:

- an emitter electrode (32);
- a resistor layer (34);
- a dielectric layer (36) overlying the resistive layer;
- a gate electrode (38) overlying the dielectric layer above the resistive layer and having lateral edges in approximate vertical alignment with lateral edges of the dielectric layer; and
- a conical electron-emissive element (40) comprised of molybdenum (column 6, line 28) situated in a composite opening extending through the gate electrode and the dielectric layer.

However, Cleeves fails to teach or fairly suggest a carbon based electron-emissive element positioned over sections of an electrically conductive seed layer.

Xu discloses, in figure 7D and throughout the disclosure, the substitution of carbon fibers (142) positioned over sections of an electrically conductive seed layer (134) which overlies a portion of a resistor layer (132), for that of a conical electron-emissive element comprised of molybdenum (column 1, lines 51-55).

It would have obvious to one of ordinary skill in the art at the time the invention was made to substitute carbon fibers for the conical electron-emissive element of Cleeves because the fibers are more stable than the metal cone structures and they do not contaminate easily under normal working conditions thereby increasing the reliability of the electron-emissive elements and improving the brightness of the device.

Re claim 2: Cleeves discloses, in figure 3 and throughout the disclosure, a device comprising:

- an emitter electrode (32);
- an electrically resistive layer (34) overlying at least a portion of the emitter electrode;
- a dielectric layer (36) overlying the resistive layer;
- a plurality of laterally separated gate electrodes (38) overlying the dielectric layer above the resistive layer; and
- a multiplicity of conical electron-emissive elements (40) including a plurality of unconnected sections above the emitter electrode and situated in composite openings extending through the gate electrodes and the dielectric layer.

However, Cleeves fails to teach or fairly suggest the electron-emissive elements grown from a seed layer.

Xu discloses, in figure 7D and throughout the disclosure, the substitution of carbon fibers (142) positioned over sections of an electrically conductive seed layer (134) which overlies a portion of a resistor layer (132), for that of a conical electron-emissive element comprised of molybdenum (column 1, lines 51-55).

It would have obvious to one of ordinary skill in the art at the time the invention was made to substitute carbon fibers for the conical electron-emissive element of Cleeves because the fibers are more stable than the metal cone structures and they do not contaminate easily under normal working conditions thereby increasing the reliability of the electron-emissive elements and improving the brightness of the device.

Re claim 13: Cleeves discloses, in figure 3 and throughout the disclosure, an electron-emitting device comprising:

- an emitter electrode (32);
- a gate electrode (38); and
- a plurality of groups of conical electron-emissive elements (40) situated in one or more openings in the gate electrode.

However, Cleeves fails to teach or fairly suggest a seed layer including at least two laterally separated sections, each section of the seed layer electrically coupled between one or more groups of electron emissive elements and the emitter electrode.

Xu discloses, in figure 7D and throughout the disclosure, the substitution of carbon fibers (142) positioned over sections of an electrically conductive seed layer

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(134) which overlies a portion of a resistor layer (132), for that of a conical electron-emissive element comprised of molybdenum (column 1, lines 51-55).

It would have obvious to one of ordinary skill in the art at the time the invention was made to substitute carbon fibers for the conical electron-emissive element of Cleaves because the fibers are more stable than the metal cone structures and they do not contaminate easily under normal working conditions thereby increasing the reliability of the electron-emissive elements and improving the brightness of the device.

Re claims 6 and 19: Xu discloses, in figure 7D and throughout the disclosure, the multiplicity of electron-emissive elements (142) comprising carbon (column 2, line 21).

Re claims 5 and 17: Xu discloses the dielectric layer comprising a single layer of silicon dioxide (column 21, line 19).

Re claims 7 and 20: Xu discloses, in figure 7D and throughout the disclosure, the multiplicity of electron-emissive elements (142) being filaments (column 2, line 21).

Re claim 10: Cleaves discloses, in figure 3 and throughout the disclosure, the electron-emissive elements (40) defining a single pixel of a display system.

Re claim 11: Xu discloses the electron-emissive elements (142) being allocated into a number of laterally separated sets, each set comprising multiple electron-emissive elements (142) overlying at least one of the sections of the seed layer (134).

Re claim 14: Cleeves discloses, in figure 3 and throughout the disclosure, an electrically resistive layer (34) overlying at least a portion of the emitter electrode (32).

Re claim 15: Cleeves discloses, in figure 3 and throughout the disclosure, a dielectric layer (36) disposed between the electrically resistive layer (125) and the gate electrode (38).

Re claim 21: Xu discloses, in figure 3 and throughout the disclosure, the sections of the seed layer (134) symmetrically over-align with the openings of the gate electrode (123).

Re claim 22: Cleeves discloses, in figure 3 and throughout the disclosure, multiple electron-emissive elements corresponding to a single pixel (72) of a display system.

Re claim 23: Cleeves discloses, in figure 3 and throughout the disclosure, multiple sections of the electron emissive elements corresponding to a single color (72) for a pixel of a display device.

Claims 3 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cleeves and Xu as applied to claims 2 and 13 above, and further in view of Xie et al. (US Patent 6,204,597; hereinafter Xie).

Cleeves and Xu show all the limitations as shown above, including a dielectric layer.

However, Cleeves and Xu fail to teach or fairly suggest the dielectric layer comprising a dual layer of silicon nitride and silicon dioxide.

Xie discloses, in figure 6 and in column 2, lines 10+, a field emitter display having a dual layer of silicon nitride and silicon dioxide for the dielectric layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the dielectric layer disclosed by Cleeves and Xu with a dual dielectric layer because by using a dual layer the electric field strength at the electron emitter is improved and therefore improving the overall display image resolution.

Claims 4 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cleeves and Xu as applied to claims 1 and 13 above, and further in view of Rolfson et al. (US Patent 5,831,378; hereinafter Rolfson).

Cleeves and Xu show all the limitations as shown above including a dielectric layer.

However, Cleeves and Xu fail to disclose a single layer dielectric layer comprising silicon nitride.

Rolfson discloses, in figure 1 and in column 4, lines 15+, a field emitter display having a single layer of silicon nitride as the dielectric layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the dielectric layer disclosed by Cleeves and Xu with a single layer of silicon nitride as the dielectric layer because by using silicon nitride in place of the silicon dioxide, the insulating layer has a higher mechanical strength than the oxide.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Keaney whose telephone number is (571)272-2489. The examiner can normally be reached on Monday-Thursday 5:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571)272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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